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1995 Feature Article - Valuing Australia's Natural Resources - Part 2

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This is the second of two articles reporting on the ABS's work on the valuation of natural resources, in the context of the recently released national balance sheets (Occasional Paper: National Balance Sheets for Australia, Issues and Experimental Estimates 1989 to 1992, ABS cat. no. 5241.0). "Natural resources" in this context cover only land, forests and subsoil deposits. The previous article, published in the August 1995 edition of Australian Economic Indicators, covered the valuation of subsoil assets, and presented the ABS's estimates for those assets. This article describes the valuation issues, and presents the ABS's estimates of land and forests in Australia.

In line with the recommendations of A System of National Accounts 1993 (SNA93), the ABS has used the basic principle that the valuation of an asset must be related to its ability to earn its owner an income, either immediately or at some definable future date. SNA93 also recommends that, where possible, asset valuation should be market or transaction based. However, for the most part, there are insufficient data on transactions in natural resources to provide a suitable way to do this. Consequently, the ABS has used the net present value (NPV) method for valuing Australia's forests, whilst administrative data have been used as a proxy for market price data in the estimates of land values.

FORESTS

SNA93 does not specify the types of forests which should be included in the national balance sheet. The ABS has chosen to value only the timber value of those forests which are available now, or will be available in the future, for production of timber. In addition, while SNA93 recommends that market value should be the basis for valuations, there are too few transactions from which to determine a "market value". As a result, indirect valuation techniques have been used as a proxy for the economic value of forests.

All publicly owned forest outside conservation reserves and all private forest are potentially available for timber production, although a number of constraints reduce the area of forest that is actually available. For publicly owned forests, the constraints include the accessibility of the resource, the economic feasibility of extracting timber and the setting aside of specified areas of production forest under management codes of practice. National parks, wilderness areas, water catchment areas and those inscribed on the World Heritage List, (for example, the Lord Howe Island Group and the Wet Tropics of Queensland), have been excluded from the valuation because logging is prohibited. The availability of privately owned forests for timber production may be constrained by accessibility and financial considerations and by the intentions of the landowner.

Forests with value other than timber value

Placing a non-timber value on forests is very difficult and highly contentious. Even though, in

principle, some non-timber values can be estimated, the exercise is fraught with problems. There are clear economic benefits from forests, such as lowering watertables, preventing soil erosion, and maintaining water turbidity or nutrient levels. Forests also generate economic benefits through activities such as tourism. However, at present there are no satisfactory methods of assigning dollar values to these benefits. In addition, non-economic values of forests such as their role in the maintenance of bio-diversity or as carbon sinks are beyond the scope of the work reported here.

Proxy market value

There is no universally accepted method of forestry accounting or valuation in Australia. The NPV method, which is recommended by SNA93, has been chosen by the ABS for the valuation of forests because it is regarded as a reasonable approximation of market value. The other approaches examined were the net price method (footnote 1) and the replacement cost method (footnote 2) but, as with subsoil assets, both methods were found to be unsatisfactory.

The ABS approach

Forests have been broken down into two broad types: native forests (which account for approximately 90 per cent of all forest area, including a very small area of broadleaved plantations) and coniferous plantations.

Native forests (including broadleaved plantations)

For native forests (including broadleaved plantations), the stream of future net income was calculated for each forest age group. The future net income was derived from the size of the existing forests (number of hectares or thousand trees) multiplied by the yield per hectare (or thousand trees) for sawlogs and pulplogs, with the results being multiplied by the stumpage fees per cubic metre for sawlogs and pulplogs respectively. Stumpage fees were taken to be equivalent to economic rent (footnote 3). The future income streams were then discounted over the time to maturity of the forest, on the assumption that current production rates will be maintained through the forests' lives.

The weighted average cost of capital is the most common discount rate used by private forestry organisations in Australia. Consequently, based on an average fixed loan rate for business, a nominal rate of 10 per cent, or a real rate of 7.5 per cent, seems appropriate. This is consistent with overseas experience which suggests real rates in the range of 6 to 10 per cent are realistic.

At present, there are no comprehensive data sources to provide annual estimates of the total area of forest available for timber production. However, the survey by the National Forest Inventory found that 22.1 million hectares of native forest were available for logging in 1990. In addition, data from ABARE indicate that there were over 100,000 hectares of broadleaved plantation forest, also available for timber production. A combination of current production volumes and changes in the size of the total native forest area were used to produce yearly balances of standing timber from 30 June 1989 to 30 June 1992, using data supplied to the Resource Assessment Commission (RAC) in 1990 as the base inventory year. The estimates of the value of Australia's timber resources provided here are based on the estimated net area of forest available for production in each State and Territory.

The Wells report (1992) to the RAC for the Forest and Timber Inquiry in 1992 provided data on the **age structure** of Australia's forests (footnote 4), including harvesting as well as the associated **yields** of sawlog and pulplog plus other wood in terms of cubic metres per hectare of gross roundwood equivalent. Where yields for either mature or old-growth forests were not shown in Wells' report, the yields were assumed to be the same as the oldest regrowth forests.

Stumpage fees from public forests were available from ABARE but pricing information for private forests is more difficult to obtain because it is commercially sensitive. In addition, many forests do not have current stumpage fees available since their trees are not yet of harvestable age. Stumpage fees for these forests need to be estimated from information about other forests. In cases where they are available for total forest and plantation removals only, hardwood and softwood stumpage fees were estimated based on current price trends.

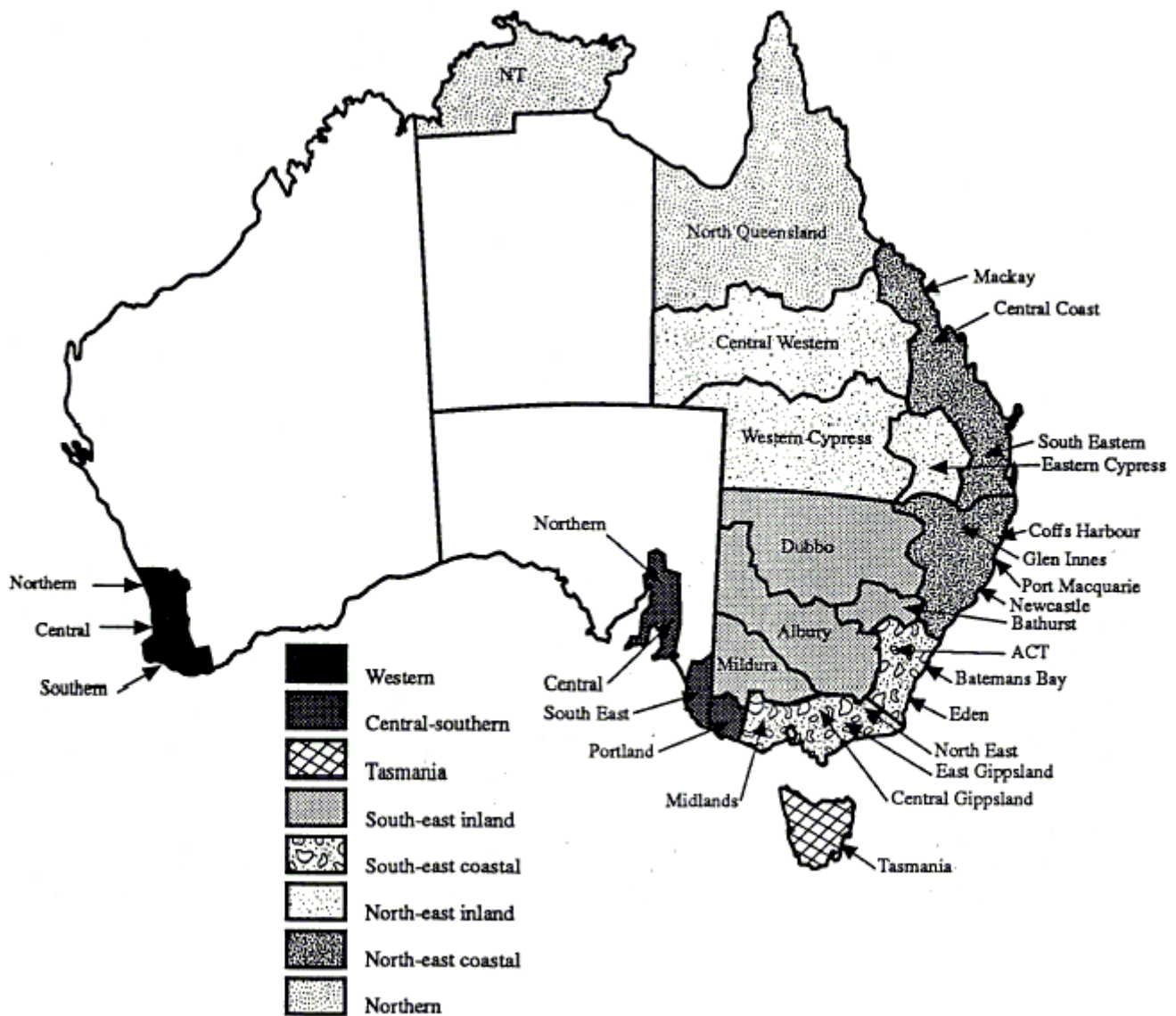
A further problem concerns the use of stumpage fees as a proxy for economic rent. Problems with the use of stumpage fees include: a) the fees may include a non-rent component (for example, service costs for maintaining roads); b) they may not be the appropriate equivalent; and c) the stumpage fee of timber depends on many variables (including straightness, knot size, log size and the location of the tree relative to the nearest mill) and will vary among regions.

Some data shortcomings

There are several problems with the ABS's approach to valuing native forests (including broadleaved plantations). First, it ignores any value that may be derived from periodic thinning. The approach taken was judged to be more accurate than using the data on thinning as there was no suitable way in which the two sets of data could be integrated. Second, it assumes that the present young forest will produce the same volumes as the existing mature forests. Changes in management techniques of forests may result in substantially different yields. For example, more intensive use of the land may produce higher yields. Alternatively, the elimination of clear-cutting may increase operational costs.

There are also quite a few problems with the data. First, there are no adequate production data, so it is not possible to assess how efficiently the forests are being harvested or managed. (Only total production by State for hardwoods and softwoods was available: there was no breakdown for each of the forest types.) Second, inventory data have spatial and temporal coverage problems, as the inventories are updated only infrequently and the actual extent of the forest coverage may be very different from the apparent situation in the inventory. Third, the data available are at a very high level of aggregation which may well have led to aggregation biases (see Figure 1 showing the 17 forest regions used: in NSW and Queensland data were available for some sub-groups of particular regions and these data were compiled separately and aggregated to State totals; some regions cut across State boundaries and separate data were compiled for the sub-groups thus created). This problem is probably serious with regard to the assumption to allocate value of forested areas to one type of tree, when there is undoubtedly a wide variety of trees in any given area.

FIGURE 1. FORESTRY REGIONS OF AUSTRALIA



Source: Resource Assessment Commission, Forest and Timber Inquiry Final Report 1992.

Results

Despite these data shortcomings, the ABS judges these estimates to be acceptable. Table 1 shows the value of Australia's native forests (including broadleaved plantations) by State at discount rates of 5 per cent, 7.5 per cent, and 10 per cent, as at 30 June 1989 to 1992. Using the ABS's preferred discount rate of 7.5 per cent, Australia's native forests and broadleaved plantations were estimated to be worth \$9 billion as at 30 June 1992. This figure represents 0.5 per cent of the value of total assets, and 0.6 per cent of Australia's net worth at 30 June 1992. Over the three previous years, the relative importance of broadleaved forests as a percentage of net worth remained very stable.

TABLE 1. VALUE OF AUSTRALIA'S NATIVE AND BROADLEAVED FORESTS, AS AT 30 JUNE (\$ MILLION)

		1989			1990			1991			1992	
		5% discount	7.5% discount	10% discount	5% discount	7.5% discount	10% discount	5% discount	7.5% discount	10% discount	5% discount	7.5% discount
New South Wales	Broadleaved plantation	27	22	17	28	22	17	30	23	18	29	22
	Native forests	1,672	1,640	1,630	1,760	1,728	1,720	1,824	1,790	1,782	1,791	1,759

Victoria	Total	1,699	1,662	1,647	1,788	1,750	1,737	1,854	1,813	1,800	1,820	1,781	:
	Broadleaved plantation	9	8	6	9	8	7	12	10	9	13	11	:
	Native forests	1,060	1,043	1,036	1,122	1,104	1,097	1,193	1,175	1,167	1,213	1,194	:
Queensland	Total	1,069	1,051	1,042	1,131	1,112	1,104	1,205	1,185	1,176	1,226	1,205	:
	Broadleaved plantation	-	-	-	-	-	-	1	-	-	1	-	:
	Native forests	1,857	1,380	1,265	2,049	1,518	1,392	2,176	1,615	1,482	2,206	1,636	:
South Australia	Total	1,857	1,380	1,265	2,049	1,518	1,392	2,177	1,615	1,482	2,207	1,636	:
	Broadleaved plantation	-	-	-	-	-	-	-	-	-	-	-	:
	Native forests	-	-	-	-	-	-	-	-	-	-	-	:
Western Australia	Total	-	-	-	-	-	-	-	-	-	-	-	:
	Broadleaved plantation	26	22	21	47	44	42	76	72	69	84	80	:
	Native forests	1,998	1,355	1,228	2,085	1,405	1,272	2,165	1,473	1,337	2,144	1,451	:
Tasmania	Total	2,024	1,377	1,249	2,132	1,449	1,314	2,241	1,545	1,406	2,228	1,531	:
	Broadleaved plantation	82	79	78	93	91	89	104	100	99	123	106	:
	Native forests	2,760	2,687	2,653	2,808	2,733	2,701	2,631	2,563	2,533	2,655	2,586	:
Northern Territory	Total	2,842	2,766	2,731	2,901	2,824	2,790	2,735	2,663	2,632	2,778	2,692	:
	Broadleaved plantation	-	-	-	-	-	-	-	-	-	-	-	:
	Native forests	146	145	145	164	162	162	177	176	176	183	181	:
Australian Capital Territory	Total	146	145	145	164	162	162	177	176	176	183	181	:
	Broadleaved plantation	-	-	-	-	-	-	-	-	-	-	-	:
	Native forests	-	-	-	-	-	-	-	-	-	-	-	:
Australia	Total	-	-	-	-	-	-	-	-	-	-	-	:
	Broadleaved plantation	144	131	122	177	165	155	223	205	195	250	219	:
	Native forests	9,493	8,250	7,957	9,988	8,650	8,344	10,166	8,792	8,477	10,192	8,807	:
	Total	9,637	8,381	8,079	10,165	8,815	8,499	10,389	8,997	8,672	10,442	9,026	:

Coniferous plantations

The ABARE quarterly publication Quarterly Forest Product Statistics provides data on areas of plantations by land ownership basis, by State and by type of forest. In addition, harvesting information supplied by ABARE has been used for reconciling yearly balances of standing timber.

To estimate tree age profiles for coniferous plantations, only planting data were required as it was assumed that forests are harvested at 30 years of age. Yearly planting data were obtained from ABARE from 1975. Prior to that, plantings were estimated based on changes in total area of plantations as there were no data on numbers of plantings before 1975.

Coniferous forests were valued using an insurance schedule provided by a private insurance company. Insurance data were used as these were considered to represent a close approximation to market value. The schedule shows the value of each hectare of plantation from 1 to 30 years of age as determined by the Australian Forest Growers Association. Plantation forests below 10 years of age are considered to be below merchantable age and are valued on

the basis of indexing historical maintenance and establishment costs. Plantations above this age are valued by discounting the expected future cash flow from the crop.

Table 2 shows the value of Australia's coniferous plantation forests using insurance data as at 30 June, 1989 to 1992, at which latter date the total value of Australia's coniferous plantation forests was \$6 billion. This represents a significantly higher value per hectare than the native and broadleaved plantation forests. At 30 June 1992, an average hectare of coniferous forest was worth \$6,465, broadleaved plantations averaged \$1,873 per hectare, while native forests averaged \$398 per hectare. Consequently, while coniferous forests account for only 4 per cent of the total forest area available for production in Australia, they represented 41 per cent of the value at 30 June 1992. This proportion has been on the increase since 1989, when coniferous forests accounted for less than 36 per cent.

TABLE 2. VALUE OF AUSTRALIA'S CONIFEROUS PLANTATION FORESTS USING INSURANCE DATA, AS AT 30 JUNE (\$ MILLION)

	1989	1990	1991	1992
New South Wales	1,093	1,260	1,465	1,520
Victoria	1,057	1,207	1,388	1,427
Queensland	961	1,076	1,225	1,261
South Australia	626	688	784	778
Western Australia	411	467	528	547
Tasmania	379	432	499	522
Northern Territory	24	27	32	32
Australian Capital Territory	89	92	97	94
Australia	4,640	5,249	6,018	6,181

These estimates may tend to overstate the forest resources available. While it is often assumed that trees will regrow, it is by no means certain that they will or that there will be no change in the quality of the new trees. Soil erosion and different species regrowth are two examples of adverse impact on forests that harvesting can produce. The area of forest on the inventory may remain the same after logging but the volume of trees that regrow may be smaller, and the type of tree may be of lower value as timber and be less appropriate to the local ecology.

With such vast areas of forest there is a need for these quality deteriorations to be reflected in the data. Otherwise, a very false impression may be given by both the monetary and the physical estimates.

LAND

Land is defined in SNA93 as the ground itself, including the soil covering and any associated surface water. The associated surface water includes any inland waters over which ownership rights can be exercised and which can, therefore, be the subject of transactions.

Excluded are any buildings or other cultivated flora and fauna on the land, such as cultivated crops, trees and livestock; subsoil assets; and non-cultivated biological resources, such as wildlife and fisheries.

The estimates cover the value of freehold and leasehold land in private hands, plus land owned by Commonwealth Government business enterprises. Unalienated Crown land, including land

potentially subject to Mabo-like claims, has been excluded from these estimates because of the difficulty in establishing an appropriate value. Land held, but not leased out, by State and local government business enterprises is also excluded because of the lack of data. The significance of these exclusions is not known but it is thought that they do not materially affect the levels and almost certainly have no significant impact on the changes over time in the estimated values.

The land estimates were prepared on a consistent basis for each State and Territory and are based on the concept of "site value". Site value includes the value of invisible improvements to the land that cannot be separated from the land, such as clearing of trees and drainage work, as well as the unimproved capital value of the land itself. Estimates of site values were taken from the Coleman Report (1993) to the Federal government which was produced to assist the comparison of the relative capacities of the States and Territories to raise revenues from owners of land and transactions therein. The 1992 estimates were produced by State Office representatives of the Australian Valuation Office. Land is valued at its approximate current purchase price, including written-down costs of ownership transfer.

Data shortcomings

Using administrative data has certain shortcomings. The data are compiled for use by governments when assessing the potential for raising revenue from land rates (land taxes) and taxes on transactions in land. Their estimation processes use whatever data are available for the given area. However, the transaction is based on the total value of the real estate, so that land is not separated from the value of the buildings, etc. In consequence, any attempt to separate them in areas where there are few, if any, vacant lots will be subject to a certain amount of subjectivity.

A further problem, mentioned above, is that invisible improvements (such as clearing) are included in the site value estimates used to value land. The expenditure on such improvements is regarded as gross fixed capital expenditure and will thus be double counted, to the extent that such expenditures have not been fully depreciated and will be included in "tangible fixed assets - non-dwelling construction" on the balance sheet.

There are other approaches to valuing land:

- The value of the land may be assumed to have a fixed ratio to the value of the structure. However, such a fixed relationship seems implausible and is unlikely to reflect the business cycle.
- Land price indices have an intuitive appeal but areas with the highest land values, city centres, have the least available vacant land from which a land price index could be developed.
- Surveys of households, governments and businesses, are very expensive and are unlikely to yield very useful results. The estimates derived from such surveys are likely to be very subjective, and respondents would find it difficult to value land separately from the buildings and other improvements.

Results

Overall, the ABS judges these estimates to be of reasonably high quality, and the alternative approaches have not been pursued. The ABS believes that the estimates represent a reasonable proxy to market valuation, and have adequately reflected the business cycle's movements over these years.

Table 3 provides annual estimates of the site value of privately-held land and land owned by

Commonwealth Government business enterprises in Australia, by State and purpose from 30 June 1984 to 30 June 1992. Table 4 shows the percentage changes in the value of land from the previous year for the period 30 June 1984 to 30 June 1992.

TABLE 3. VALUE OF LAND, AS AT 30 JUNE EACH YEAR (\$ BILLION)

		1984	1985	1986	1987	1988	1989	1990	1991	1992
New South Wales	Residential	73.8	81.3	87.1	102.8	158.2	173.3	162.0	178.3	171.1
	Commercial	18.5	20.2	21.8	33.5	43.8	51.7	45.7	36.6	30.4
	Rural	16.7	18.2	19.6	21.1	22.5	23.0	23.4	23.8	19.0
	Total	109.0	119.7	128.5	157.3	224.5	248.0	231.1	238.7	220.6
Victoria	Residential	39.4	49.1	54.3	67.5	78.7	98.0	93.0	90.8	77.2
	Commercial	11.0	13.8	16.1	17.4	29.9	32.7	27.3	26.5	21.2
	Rural	9.7	11.0	12.3	13.7	15.0	15.5	16.1	16.6	15.0
	Total	60.1	73.9	82.8	98.6	123.6	146.2	136.3	133.9	113.3
Queensland	Residential	20.8	22.3	22.3	26.2	33.2	43.4	51.2	57.3	63.1
	Commercial	5.8	6.0	6.3	7.1	8.5	12.1	12.5	12.0	10.5
	Rural	4.8	5.4	6.0	6.6	7.2	8.1	9.0	9.8	8.4
	Total	31.4	33.7	34.7	39.9	48.9	63.5	72.6	79.1	82.0
South Australia	Residential	11.6	14.2	14.6	15.6	16.7	18.8	21.8	22.6	24.2
	Commercial	2.4	2.8	3.4	3.4	3.9	5.1	5.8	5.8	5.0
	Rural	5.4	5.8	6.2	6.6	7.0	6.9	6.9	6.8	5.1
	Total	19.4	22.7	24.2	25.6	27.7	30.8	34.5	35.2	34.2
Western Australia	Residential	10.4	12.8	13.4	14.9	22.1	26.2	29.4	28.2	29.3
	Commercial	2.8	3.4	3.9	4.5	6.2	7.1	7.9	6.9	5.5
	Rural	4.2	4.8	5.4	6.0	6.6	6.8	7.1	7.4	7.4
	Total	17.4	21.0	22.7	25.4	34.9	40.1	44.4	42.4	42.2
Tasmania	Residential	1.8	2.0	2.1	2.3	2.8	3.3	3.6	4.0	4.4
	Commercial	0.5	0.5	0.6	0.5	0.7	0.8	0.8	0.9	0.9
	Rural	1.1	1.2	1.3	1.5	1.6	1.8	1.9	2.1	2.1
	Total	3.4	3.7	4.0	4.3	5.1	5.8	6.4	7.0	7.3
Northern Territory	Residential	0.8	1.0	1.0	1.1	1.0	1.0	1.1	1.2	1.3
	Commercial	0.4	0.4	0.5	0.5	0.5	0.5	0.5	0.5	0.5
	Rural	0.1	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
	Total	1.3	1.6	1.7	1.8	1.8	1.8	1.8	1.9	2.0
Australian Capital Territory	Residential	2.7	2.8	3.1	3.4	3.7	4.0	4.6	5.1	5.6
	Commercial	0.5	0.6	0.9	1.1	1.4	1.4	1.5	1.4	1.4
	Rural	na	-	-	-	-	-	-	-	-
	Total	3.2	3.4	4.0	4.6	5.1	5.5	6.0	6.6	7.1
Australia	Residential	161.3	185.5	198.0	233.9	316.6	368.0	366.7	387.4	376.2
	Commercial	41.9	47.7	53.5	68.1	94.8	111.4	101.9	90.7	75.4
	Rural	42.0	46.6	51.1	55.6	60.1	62.3	64.5	66.7	57.1
	Total	245.2	279.7	302.6	357.6	471.5	541.7	533.1	544.8	508.7

Source: Australian Valuation Office

TABLE 4. VALUE OF LAND, PERCENTAGE CHANGES FROM PREVIOUS YEAR

		1985	1986	1987	1988	1989	1990	1991	1992
New South Wales	Residential	10.08	7.16	18.05	53.86	9.56	-6.50	10.02	-4.04
	Commercial	9.24	8.24	53.36	30.85	18.07	-11.60	-19.51	-16.94
	Rural	8.69	8.00	7.40	6.89	1.85	1.82	1.79	-20.17
	Total	9.72	7.47	22.42	42.67	10.45	-6.79	3.29	-7.58

Victoria	Residential	24.61	10.72	24.28	16.62	24.50	-5.14	-2.32	-14.98
	Commercial	24.90	17.02	8.14	71.43	9.34	-16.49	-3.01	-20.00
	Rural	13.48	11.88	10.62	9.60	3.73	3.60	3.47	-9.64
	Total	22.86	12.07	19.10	25.33	18.32	-6.75	-1.77	-15.38
Queensland	Residential	7.63	-	17.28	26.80	30.57	17.87	12.08	10.12
	Commercial	3.89	4.52	12.26	19.90	42.49	3.28	-3.97	-12.50
	Rural	12.38	11.00	9.92	9.01	12.19	10.86	9.79	-14.29
	Total	7.67	2.59	15.10	22.63	29.92	14.21	9.03	3.67
South Australia	Residential	21.97	2.63	7.33	7.15	12.15	16.17	3.44	7.08
	Commercial	15.69	24.61	-	15.14	30.48	13.58	-	-13.79
	Rural	7.50	6.97	6.52	6.12	-0.92	-	-0.92	-25.00
	Total	17.18	6.39	6.06	7.95	11.47	11.90	2.01	-2.84
Western Australia	Residential	22.88	5.13	10.97	48.65	18.22	12.22	-4.03	3.90
	Commercial	21.05	14.35	16.23	36.54	14.19	11.56	-12.63	-20.29
	Rural	13.76	12.07	10.77	9.74	3.97	3.80	3.68	-
	Total	20.36	8.23	11.83	37.31	14.82	10.67	-4.33	-0.47
Tasmania	Residential	11.46	6.14	9.31	22.50	14.51	11.63	9.18	10.00
	Commercial	8.75	3.84	-3.52	19.53	14.50	12.80	11.47	-
	Rural	12.86	11.40	10.22	9.28	9.36	8.50	7.89	-
	Total	11.50	7.49	7.83	17.61	12.88	10.82	9.10	4.29
Northern Territory	Residential	17.11	6.05	8.76	-7.42	1.47	6.34	4.24	8.33
	Commercial	10.37	1.57	7.05	4.12	1.58	-7.59	8.84	-
	Rural	13.70	11.45	10.81	9.76	-3.56	-3.23	8.84	-
	Total	14.76	5.35	8.52	-2.40	0.91	1.41	4.24	5.26
Australian Capital Territory	Residential	5.83	10.50	9.51	8.69	8.07	14.89	11.57	9.80
	Commercial	17.52	41.33	29.36	22.61	8.03	8.70	2.64	-
	Rural	n.a.	13.33	11.76	5.26	10.00	13.64	8.00	-
	Total	5.09	16.82	13.85	12.13	8.07	8.50	9.52	7.58
Australia	Residential	14.97	6.79	18.13	35.36	16.23	-0.35	5.65	-2.89
	Commercial	13.89	12.00	27.36	39.27	17.51	-8.56	-10.99	-16.87
	Rural	10.73	9.66	8.81	8.10	3.65	3.53	3.40	-14.39
	Total	14.06	8.16	18.19	31.86	14.88	-1.59	2.20	-6.63

Source: Australian Valuation Office
n.a. = Not Applicable

At 30 June 1992, the total value of land in Australia was estimated to be worth \$509 billion. Residential land accounted for 74 per cent of this value, commercial land accounted for 15 per cent, and rural land made up 11 per cent of the total land value. These percentages have not remained stable over the eight years. For example, at 30 June 1984, residential land amounted to 66 per cent, compared with 17 per cent for each of rural and commercial land.

On a State by State basis, the contribution of New South Wales, Victoria and South Australia to the total value of Australian land fell slightly over the eight years. Over that same period Queensland's land value as a percentage of Australia's, rose from 13 per cent to 16 per cent. The percentage contributions of the other States remained relatively stable.

As can be seen in Table 4, prior to 30 June 1989 the values of all types of land, across all States and Territories, were generally increasing each year. However, Tasmania and the Northern Territory were the only States or Territories not to experience a decline in value across any type of land between 30 June 1989 and 30 June 1992. Both New South Wales and Victoria experienced drops in land values across all types of land between 30 June 1991 and 30 June 1992.

In the context of Australia's balance sheets, at 30 June 1992, land accounted for 77 per cent of

the value of Australia's non-produced assets, and 30 per cent of Australia's net worth. However, these figures represent fairly significant drops since 30 June 1989. At that time, land represented 82 per cent of the value of Australia's non-produced assets, and 34 per cent of Australia's net worth. These declines are fully consistent with the movement in land prices from a period of rapid economic growth (1989) to one of minimal growth after a recession (1992).

CONCLUSION

This article, in conjunction with Part 1 published in the August 1995 edition of the Australian Economic Indicators, has discussed the issues related to the valuation of subsoil assets, land and forests, as well as presenting the ABS's estimates for these assets. They represent a fairly significant part of the country's overall wealth.

There are conceptual, methodological and data issues that need to be explored further. Interpretation of the results should be undertaken with care. Readers are invited to comment by contacting:

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Footnotes

1. Net price method in relation to forests

One proxy market value for forests may simply be the quantity of timber in a forest (in cubic metres), multiplied by the stumpage fee. However, because estimates derived using the "net price" approach do not discount the values of the forest according to the number of years until maturity, the "net price" approach will overestimate the existing timber value as implicit in this approach is the assumption that future income rises at the rate of discount which has not been borne out by experience. < Back

2. Replacement cost method in relation to forests

There are two ways of valuing forests using the replacement cost method:

- indexing forward the historical costs of establishing a forest where the costs exist; or
- discounting back the projected costs of replacing a forest.

Indexing costs forward can be applied where forests were purposely established and the associated cash flows are recorded. The main problem with this method is that the subsequent value may be very different from the actual market value when the costs are indexed over many years.

Discounting back the future replacement costs can be applied to cultivated and uncultivated forests. It does, however, have the problem of defining replacement. Some natural forests may take hundreds of years before they can be considered to have the same timber diversity, quality and quantity.

As with indexing historical costs, discounting future costs will not necessarily approximate market price because market price is determined by supply and demand factors rather than the cost of

reproduction. < Back

3. Economic rent is the return to the owner of the resource for the use of that resource, excluding costs necessary to replace it. < Back

4. The Wells report divided forests into the regrowth, mature and old-growth forests. These can be defined as:

Regrowth forests are forests which replace old-growth forest after logging or natural events such as fire, but are predominantly younger or smaller than harvestable ages.

Mature forests are forests which have arisen after logging and are of rotation age or older (even-age forest), or contain trees which are mainly of harvestable size (uneven-aged forest).

Old-growth forests are the older developmental stages of the forests, characterised, at least in part, by low growth rates of trees in the tallest stratum; low to zero biomass production of trees in the tallest stratum; trees in the tallest stratum are mature to senescent; trees in the tallest stratum have very high biomass and are usually more than 100 years old. < Back

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